



Institute for Women in Trades, Technology & Science
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WomenTech Project: Making Community College Math and Technology Courses User Friendly to Women and Minorities: An Annotated Bibliography

CURRICULUMS

Math

IWITTS received five -emails strongly supporting the CORD curriculums.

CORD BRIDGES to Algebra and Geometry: Mathematics in Context. South-Western Educational Publishing, Center for Occupational Research and Development (Waco, Texas).

CORD Bridges to Algebra and Geometry: Mathematics in Context bridges the gap between abstract mathematical concepts and real-world applications. It integrates algebra and geometry while providing ongoing opportunities in critical thinking. *CORD Bridges to Algebra and Geometry* employs an interactive, workplace-centered approach to teaching the foundations of algebra and geometry. The program features hands-on math labs and cooperative group activities, giving students the opportunity to experience mathematical concepts. It answers the question "Why do I have to learn this?" by offering connections and applications to everyday life and emphasizing the use of math in the workplace.

Mathematics in Context employs an interactive, workplace-centered approach to teaching algebra concepts. *CORD Algebra 1* teaches abstract concepts through concrete experiences. It can be used for various course offerings - algebra 1 over two years, block scheduling, and one-year algebra classes - because of its multiple packaging formats: single text, two-volumes, or chapter modules. *CORD Algebra 1* integrates topics such as trigonometry, statistics, and probability. As topics are introduced and developed, students experience concepts through real-world applications. Video segments set the stage for each chapter by demonstrating how algebra is used in today's workplace. Hands-on math labs give students the opportunity to experience mathematical concepts.

<http://www.cord.org/lev2.cfm/58>

"They offer a math curriculum through algebra that is pre-packaged contextual referenced, and user friendly. The CORD people offer as much support as you want. You can send a team to their site for training if you like." Randy Stolze, Monmouth County Vocational School District

"The math program that I recommend is CORD BRIDGES to Algebra and Geometry: Mathematics in Context!...I supervised the pilot program...for four years at Sweetwater High School in National City, California. The instructor also teaches community college and says it would be very appropriate. There are several levels of this program." Carmen Plank, PI for Girl Power (NSF) grant in Sweetwater Union High School District

CARNEGIE-Learning

Carnegie Learning's Cognitive-Tutor College Algebra Program covers a full-semester algebra course at the college level. The focus is on making connections between multiple representations (tables, graphs, equations and text) and on modeling real-world situations. The Cognitive Tutors™ ability to customize instruction for individual students really shines in Developmental Mathematics, where students typically encompass a wide range of backgrounds and abilities in a single classroom. The Cognitive Tutor College Algebra software follows students step-by-step as they solve problems. The Cognitive Tutor™ focuses on each student's problem-solving process, helping each student to develop a conceptual understanding of the mathematics that will help to find the answer.

http://www.carnegielearning.com/products_fs.html

I Can Learn: College Level Math Courses (by JRL Enterprise & Tulane research based) are designed to effectively enable remedial and/or developmental students, both traditional and non-traditional, to master the skills needed to compete and succeed in the post-secondary learning environment. The I CAN Learn® Courses cover over 104 lesson objectives that are structured around NCTM standards along with periodic quizzes and cumulative reviews. There are 2 levels of coursework: Basic College Mathematics, and Beginning Algebra. The content in both courses is relevant to real world applications. Students gain the knowledge needed to meet and surpass district, state and national math objectives, master the objectives covered on the ACT and SAT, and prepare for further college level mathematics courses.

www.icanlearn.com

Math Foundations

Developmental/basic math program with Internet component that can be used by both instructors and students for class rosters, tracking student progress, posting syllabi, homework and tests, accessing electronic flashcards, taking exams, and communicating with the instructor. The two texts (Basic Math, and Pathway to Algebra) are designed for use at the community college or workforce level. Both use contextual learning/teaching and both are oriented toward real-world applications. Two-years of pilot testing. Contact: CCI Publishing, 324 Kelley Drive, Waco, TX 76710 (254) 755-7769

mleary@educatalog.com

Applied Mathematics (Michigan Center for Career and Technical Education)

An applied, hands-on learning approach set of materials that covers concepts ranging from pre-algebra through Algebra I geometry, trigonometry, statistics, probability, computer spread sheets and graphics, and statistical process control (SPC). For secondary schools and adult retraining programs. Contains video programs, text with glossary, laboratory activities, problem-solving exercises, and teacher and student guides. Flexible program that can be used over two years or certain lessons may be used to augment an existing course.

<http://www.mccte.educ.msu.edu/cs/salescat/apliedac.html>

Just In Time Algebra – Context based, with Animation!

A Program for developmental students who are designated by their score on a placement test. Generally, the students are math phobic and math anxious; lack confidence; and demonstrate poor problem solving skills. The Beginning Algebra course places a stronger emphasis on solving problems. The topics taught to solve problems are estimation, graphing, and algebraic algorithms, using real world applications. Almost every problem is an applied problem. We use a

"just in time approach" for the curriculum. The applications not only motivate the students; but also teach the material. Each lesson is divided into three parts, Class Work, Group Work, and Homework. The Class Work portion, taught by the instructor, consists of applications designed to motivate the traditional algebraic skills. This gives each instructor freedom to present the material the way they see fit. The Group Work section allows the student to immediately try problems in a collaborative learning environment. Animated ToolBook modules provided on a CD provide a different learning style which is beneficial for some students. The philosophy of this new course is Algebra is for solving problems. Applications are used to give concrete meanings to the abstract concepts. The course changes the priorities of the topics taught. Developed with an NSF grant by Montgomery County Community College in Blue Bell, PA by Walter Hunter and Roseanne Hofmann. E-mail: rhofman@mc3.edu for more information.

Washington Applied Mathematics Council (WAMC)

The goal of the WAMC is to provide teacher training in a instructional delivery system incorporating "APPLIED MATHEMATICS". The Web site includes information on Applied Math Made Easy (AMME) and extensive curriculum information on CORD (including a list of teacher trainers and teachers that have received training to teach CORD applied math, computer files of CORD teaching materials and curriculum used by WAMC teachers, and a list of 4 year colleges that accept CORD applied math for admissions).

<http://www.owt.com/wamc>

CyberClass Math

A post-secondary developmental math program designed to teach basic math and pre-algebra to an adult audience. Its distinction is that the instructor-led, textbook-based program has an Internet component that allows students to take practice tests (the results of which can be forwarded to the instructor, if you choose to set it up that way), review vocabulary (on electronic flash cards) and contact the instructor, etc., online, after class, thus freeing up the instructor to spend more class time working with students. CyberClass allows the instructor to set up additional practice texts, post the class syllabus and schedule, establish hotlinks to other sites, and perform other functions. The two student texts and two teacher guides for this course were pilot tested for two years under the working title of Mathematics Foundations, and field input was addressed in the revision that became CyberClass Math. Under Mathematics Foundations, we have data showing class improvement in concept mastery, but even more telling, in reduction of student anxiety over math. In developmental students particularly, this is critical.

www.ccmath.com

Technology

CORD Principles of Technology: A Contextual Approach to Workplace Physics uniquely teaches traditional physics concepts in the context of their relationship to four energy systems—mechanical, fluid, electrical, and thermal. Principles of Technology gives students the tools they will need to adapt to the changing environments they will face on the job. Designed to teach the middle 50 percent of high school students the mathematical and scientific principles behind technology in a unique 2-year program; Allows students to discover and experience physics firsthand with modern technical equipment and over 90 hands-on lab activities; Focuses on problem-solving and mathematical skills; This program concentrates on the use of physics formulas in the workplace.

<http://www.cord.org/Lev2.cfm/59>

Appropriate For Tech Prep And Career/Technical Education Students

Ideal for implementation in Tech Prep programs and other School-to-Work and vocational initiatives, *Principles of Technology* uses contextually based teaching methods, meets workplace competencies set forth by the SCANS report, "What Work Requires of Schools" and emphasizes problem solving, decision making, hands-on learning, and real-life applications.

"I can relay my personal experience—as a girl that was afraid of algebra—and never took a trig class in my life—I learned to realize the meaning of math when I took Principles of Technology—I have often wondered if it is a way to help women see the role of math and algebra—It sure opened my eyes!!" Lorrie Toni, Director, Colorado SkillsUSA-VICA

PRINCIPLES OF TECHNOLOGY - Michigan Center for Career and Technical Education

An applied technical physics course containing 14 units in which each unit deals with one principle as it applies in the four energy systems: mechanical, fluid, thermal, and electrical. Learners gain practice in setting up experiments and manipulating machines and formulas. Contains videos, teachers guide and student text. Used for secondary and adult training programs.

<http://www.mccte.educ.msu.edu/cs/salescat/apliedac.html>

MATH & TECHNOLOGY: EFFECTIVE TEACHING FOR WOMEN & MINORITIES

Women

Teaching Mathematics Effectively and Equitably to Females, by Katherine Hanson-- Education Development Center.

TOC Includes: (1) The Current Situation: Possible social, cultural and psychological causes for differences in math achievements in different age levels; (2) Student Gender Differences: Learning Styles and Classroom Behavior, Attitudes toward Mathematics Learning, Mathematics Course Taking, Social & Family Expectations; (3) Education Issues: Discourse, Curriculum Content and Orientation, Teacher Attitudes and Behaviors, Classroom Organization and Teaching Methods; (4) Conclusions and Recommendations, The Context of Mathematics Education, New Discourse Strategies, Recommendations

http://eric-web.tc.columbia.edu/monographs/ti17_index.html

Plugged In! Program

Provides support materials for conducting activities from the Girls Science Clubhouse and Science Arcade and tips for stimulating interest in science. Start with the Guide Manual for important tips on conducting hands-on science, questioning techniques that encourage participation and depth of experience and eye-opening information about gender inequities in our society and in math, science and technology in particular. Individual program manuals contain program materials which have been targeted to specific age groups. (TOC includes: **Welcome to PLUGGED I N!** (NSF Grant Program); **Explore Gender Equity** (Global Perspective, Consider This: On the Job, Consider This: In Education, Gender Equity: The Root of the Problem); **Facilitating Learning** (Global Perspective, Facilitation Skills, Facilitation Competencies, Phases of the Experiential Learning Cycle, Age-level Characteristics and Learning Styles, What to Expect from a Girl)

<http://www.plugged-in.org>

Preparing Women and Minorities for Careers in Math and Science: The Role of Community Colleges. ERIC Digest. (1991)

This digest overviews the literature on the community colleges' special efforts to prepare underrepresented groups for careers in math and sciences. Highlighting the scope and strategies of exemplary programs, the digest explores projects and services at community colleges, and linkages between community colleges, elementary and secondary schools, and four-year schools.

http://www.ed.gov/databases/ERIC_Digests/ed333943.html

Use EQUALS to Promote the Participation of Women in Mathematics. Mayfield, K & Whitlow, B, eds. Berkeley, CA: Lawrence Hall of Science, University of California 1983. 134 pg

The purpose of this manual is to train educators through workshops providing them with the tools to teach students in classroom settings. The emphasis is on math avoidance among females in the elementary and secondary levels. Strategies and materials are designed to encourage female students to continue in mathematics courses throughout their schooling, increase students' confidence and competence in doing mathematics and relate the usefulness of mathematics to future career choices. The Appendices provide sample workshops, problem-solving activities, career activities and bibliographies.

<http://www.lhs.berkeley.edu/EQUALS>

She Does Math! Real-Life Problems from Women on the Job. Percevault, John B., and Gordon Orlick. Washington, DC: Mathematical Association of America.

This practical and well-written book presents the career histories of thirty-eight professional women and math problems related to their work. Each history describes how much math the author took in high school and college, how she chose her field of study and how she ended up in her current job. Each woman presents problems that are typical of those she has faced in her job. The problems require only high school mathematics for their solution and demonstrate how good math skills are applied to real-life problems. This book is well-suited to students who are beginning to think about career choices and provides strong female role models who work as successful technical professionals.

<http://www.maa.org/data/pubs/books/sdm.html>

Teaching/Counseling Strategies To Promote Math/Science Learning. 1986 Expanding Your Horizons in Science and Mathematics (TM) Packets-Copyright 1986 Math/Science Network.

Describes several content areas where girls need more experience and encouragement, as well as creative methods of instruction. Also, details a number of strategies which could apply to virtually any content area that have been suggested by participants in workshops.

<http://www.enc.org/topics/equity/stories/vignettes/documents/0,1341.ACQ-111312-1312,00.shtm>

"Women in Science—What Schools Can Do." *Comment on Education* 17, April 1987: 19-25.

Despite the optimistic observations of the late 1970s indicating that more Canadian women were entering careers in science, engineering and technology, current statistics show that women remain anomalies in these fields. The author looks at reasons why female students don't enter science courses and what schools can do to affect change. Strategies include emphasis on parental support of science studies, discussion in high school classes focusing on the difficulties women face of balancing a career and family, and introducing science courses earlier in the elementary level. References. [LIBR]

www.gov.on.ca/mczcr/owd/english/publications/how-hard-can-it-be/biblscl1.htm

Ideas, not Answers: A process-oriented approach to mathematics learning. By: Charlene Morrow (*Co-Director, Summer Math, Mount Holyoke College*).

This article outlines the major themes we draw from constructivist pedagogy and current gender research in mathematics education. This discussion is followed by examples of our teaching methods, which are designed specifically to create a constructivist mathematics classroom that best serves the needs of young women.

<http://www.enc.org/topics/equity/stories/vignettes/documents/0,1341,ACQ-121208-1208,00.shtm>

"Women in Science: Options and Intolerance." Edited by **Rachelle Sender Beauchamp and Lisa Avedon.** *Women's Education des femmes* 9 (Fall 1991). French and English articles.

The fifteen articles in this issue focus on transforming the science curriculum in order to encourage and increase the number of women scientists. They look at the exclusion of women from careers in science and the low numbers of women entering sciences; provide an account of an attempt to establish a new engineering program in a Canadian university; review of the African Training and Employment Centre whose programs include micro-computer training and training in computer numerical control machines; review of the Bridges to Equity training program in Toronto; provide stories by women engineers about problems they face; and discuss gender harassment and discrimination and how to transform mathematics pedagogy. [CCLOW]

Influence of Item Content and Stereotype Situation on Gender Differences in a Mathematical Problem Solving. Walsh, Margaret. Hickey, Crystal. Duffy, Jim.

Studied the effects of item content and stereotypic threat to gender differences in mathematical problem solving through two experiments, one with 63 seventh and eighth graders and the other with 174 college students. Results suggest that gender-stereotype threat could be a big factor in gender differences in mathematical problem solving.

Sex Roles: A Journal of Research; v41 n3/4 p219-40 Aug 1999

Teachers' Beliefs and Gender Differences in Mathematics: A Review. Li, Qing.

A literature review indicated that teachers have different beliefs about male and female students, tend to stereotype math as male, overrate males' math capability, and have higher expectations for males. These beliefs were found in both male and female teachers, though there were some nuances. Educational Research; v41 n1 p63-76 Spring 1999

Proportions of Women Faculty and Students in the Mathematical Sciences: A Trend Analysis by Institutional Group. Sharpe, Norean Radke; Sonnert, Gerhard.

Examines how gender proportions of faculty and undergraduate majors in the mathematical sciences vary across institutional groups and how these proportions have changed over time. Explores the relationship between the proportion of women faculty and women majors across institutional types as a test of the role-model hypothesis.

Journal of Women and Minorities in Science and Engineering; v5 n1 p17-27 1999

Minorities

Challenges in the Mathematics Education of African American Children: Proceedings of the Benjamin Banneker Association Leadership Conference. 1998 85 pp. ISBN 0-87353-458-1

Shows progressive new solutions to the challenges of teaching mathematics to African American children. Packed with insights and ideas from the 1997 Benjamin Banneker Association Leadership Conference. Focuses on three strands-teaching and learning, policy, and professional development. Addresses such issues as implications of policy decisions, effectively motivating students and achieving turnarounds, technology and its role in classroom education, and fair implementation on *Standards*-based education. Also discusses generating plans for creating written works and professional development activities. An excellent resource for formulating and obtaining real-life lesson plans based on expert recommendations. Includes summaries, discussions, and individual papers. National Council of Teachers of Mathematics

<http://poweredge.nctm.org/nctm/index.icl>

Changing the Faces of Mathematics: Perspectives on African Americans. *Edited by Marilyn Strutchens, Martin L. Johnson, and William F. Tate*

A comprehensive, thought-provoking book that focuses on equity issues in mathematics education regarding African American students. Emphasizes the need to expose teachers to positive practices that will enhance the learning of African American students. Features case studies that give insights into why students succeed and discusses pedagogical strategies that meaningfully integrate the students' culture into the classroom. Also describes a classroom in an inner-city public high school that might provide a model for change to increase the participation of African American students in advanced mathematics. 194 pp. ISBN 0-87353-461-1. 2000.

National Council of Teachers of Mathematics

<http://poweredge.nctm.org/nctm/index.icl>

Equity – Access to Math and Science for ALL Students

Raising the Bar and Closing the Gap: Increasing Academic Achievement for ALL Students, Spring 2000, Equity Issues: Gender Equity-Ohio Career/Technical Education Journal. Download at <http://www.ode.state.oh.us/ctae/equity/pubs.htm>

Equity Materials in Mathematics, Science, and Technology: A Resource Guide

This 41-page resource guide for teachers, guidance counselors, administrators, parents, and the community provides information about programs, research studies, videotapes, and organizations focused on equitable mathematics and science teaching.

[http://www.learner.org/cgi-](http://www.learner.org/cgi-bin/tlci/search_user?entry_type=refinit&description=women&result_pos=7)

[bin/tlci/search_user?entry_type=refinit&description=women&result_pos=7](http://www.learner.org/cgi-bin/tlci/search_user?entry_type=refinit&description=women&result_pos=7)

Weaving Gender Equity into Math Reform—Publications

In addition to the collaborations it is creating with the NSF-funded elementary mathematics curricula, the Weaving Gender Equity into Math Reform project is also concerned with adding to the pool of scholarship on equity in mathematics education and professional development. The publications featured on this page, look at some of the opportunities and challenges of reaching diverse learners in the standards-based classroom. Though geared towards teachers implementing standards-based mathematics curricula, these publications are also of benefit to anyone concerned about equity in the classroom.

<http://www.terc.edu/wge/publications.html>

Equity, Mathematics Reform, and Research: Crossing Boundaries in Search of Understanding. (*Journal for Research in Mathematics Education*, December 1997)

Presents a collection of the research and thinking related to equity issues in school mathematics. Examines quantitative research literature to determine trends in the mathematics achievement of social groups defined along the lines of race, class, gender, ethnicity, and language proficiency. Describes dilemmas of group deliberations for mathematics curriculum change and the need to produce a multicultural mathematics curriculum.

[National Council of Teachers of Mathematics](http://poweredge.nctm.org/nctm/index.icl)

<http://poweredge.nctm.org/nctm/index.icl>

Connections across Cultures: Inviting Multiple Perspectives into Classrooms of Science, Technology, Math & Engineering

The CaC project offers innovative, user-friendly strategies for teachers to facilitate the interest, motivation, retention, and achievement of our diverse student populations in science, math, engineering and technology. The CaC project is built upon the voices of people who are female, Native American, African American, and Latino/a. These voices have come from more than 200 interviews, 750 articles and books, classroom research, textbook analyses, and other research activities. The website includes: Teaching Strategies & Possible Solutions; Information on CaC's graduate level online course for Teachers; Information on Materials & Publications Available (including 160 page teacher's manual); and Teacher Training Information..

www.wvmccd.cc.ca.us/mc/cac